WHAT IS CLAIMED IS:

1. A collimating plate comprising:

a lens substrate;

a plurality of microlenses disposed on a surface of said lens substrate;

a plurality of light entrance areas, each having a circular form a center of which is on an optical axis of each of said plurality of microlenses and set on another surface of the lens substrate reverse to said plurality of microlenses; and

a light shield layer formed on another surface of said lens substrate reverse to said plurality of microlenses so as to cover other area than said plurality of light entrance areas,

wherein when a refractive index of said lens substrate is represented by n; a thickness of said lens substrate by t; a diameter of each of said plurality of light entrance areas by R; and a size of each of said plurality of microlenses by Sr, the following formula (1):

$$Sr \geq 2t \times \tan\theta + R \qquad (1)$$

(with the proviso that $\theta = \sin^{-1}(1/n)$)

is satisfied.

2. The collimating plate according to claim 1, further comprising a diffuse reflecting layer formed at a light entrance

side than said light shield layer so as to cover other area than said plurality of light entrance areas.

3. The collimating plate according to claim 1, wherein said plurality of microlenses are either in circular form when viewed from a direction of the optical axis and are arranged in a closest packing state or in hexagonal form when viewed from the direction of the optical axis and are arranged in a hexagonal close-packed state.

4. The collimating plate according to claim 1, wherein said refractive index of said lens substrate is between 1.4 and 2.

5. A lighting apparatus comprising:

a light source;

a lamp housing for containing said light source, whose inner surfaces are covered with a diffuse reflecting layer; and

a collimating plate,

wherein said collimating plate comprises a lens substrate;

a plurality of microlenses disposed on a surface of said lens substrate;

a plurality of light entrance areas, each having a circular form a center of which is on an optical axis of each of said

plurality of microlenses and set on another surface of the lens substrate reverse to said plurality of microlenses; and

a light shield layer formed on another surface of said lens substrate reverse to said plurality of microlenses so as to cover other area than said plurality of light entrance areas,

wherein when a refractive index of said lens substrate is represented by n; a thickness of said lens substrate by t; a diameter of each of said plurality of light entrance areas by R; and a size of each of said plurality of microlenses by Sr, the following formula (1):

$$Sr \geq 2t \times \tan\theta + R \qquad (1)$$

(with the proviso that $\theta = \sin^{-1}(1/n)$)

is satisfied.

6. A lighting apparatus comprising:

a collimating plate; and

a plurality of light sources,

wherein said collimating plate comprises a lens substrate;

a plurality of microlenses disposed on a surface of said lens substrate;

a plurality of light entrance areas, each having a circular form a center of which is on an optical axis of each of said plurality of microlenses and set on another surface of the lens substrate reverse to said plurality of microlenses; and

a light shield layer formed on another surface of said lens substrate reverse to said plurality of microlenses so as to cover other area than said plurality of light entrance areas,

wherein when a refractive index of said lens substrate is represented by n; a thickness of said lens substrate by t; a diameter of each of said plurality of light entrance areas by R; and a size of each of said plurality of microlenses by Sr, the following formula (1):

$$Sr \geq 2t \times \tan\theta + R \quad (1)$$

(with the proviso that $\theta = \sin^{-1}(1/n)$)

is satisfied, and

wherein said plurality of light sources are disposed in said plurality of light entrance areas of said collimating plate respectively.

7. The lighting apparatus according to claim 6, wherein a light emission size of each of said plurality of light sources is smaller than a size of each of said plurality of light entrance areas.

8. The lighting apparatus according to claim 6, wherein said plurality of light sources are LEDs or organic EL devices.

9. A liquid crystal display apparatus comprising:

a liquid crystal display panel; and

a lighting apparatus for launching light into said liquid crystal display panel,

wherein said lighting apparatus comprises a light source;

a lamp housing for containing said light source, whose inner surfaces are covered with a diffuse reflecting layer; and

a collimating plate,

wherein said collimating plate comprises a lens substrate;

a plurality of microlenses disposed on a surface of said lens substrate;

a plurality of light entrance areas, each having a circular form a center of which is on an optical axis of each of said plurality of microlenses and set on another surface of the lens substrate reverse to said plurality of microlenses; and

a light shield layer formed on another surface of said lens substrate reverse to said plurality of microlenses so as to cover other area than said plurality of light entrance areas,

wherein when a refractive index of said lens substrate is represented by n; a thickness of said lens substrate by t; a diameter of each of said plurality of light entrance areas by R; and a size of each of said plurality of microlenses by Sr, the following formula (1):

$$Sr \geq 2t \times \tan\theta + R \qquad (1)$$

(with the proviso that $\theta = \sin^{-1}(1/n)$)

is satisfied.

10. The liquid crystal display apparatus according to claim 9, further comprising a light diffusing plate for diffusing an image-bearing light which has passed through said liquid crystal display panel.

11. A liquid crystal display apparatus comprising:

a liquid crystal display panel; and

a lighting apparatus for launching light into said liquid crystal display panel,

wherein said lighting apparatus comprises a collimating plate; and

a plurality of light sources,

wherein said collimating plate comprises a lens substrate;

a plurality of microlenses disposed on a surface of said lens substrate;

a plurality of light entrance areas, each having a circular form a center of which is on an optical axis of each of said plurality of microlenses and set on another surface of the lens substrate reverse to said plurality of microlenses; and

a light shield layer formed on another surface of said lens substrate reverse to said plurality of microlenses so as to cover other area than said plurality of light entrance areas,

wherein when a refractive index of said lens substrate is represented by n; a thickness of said lens substrate by t; a diameter of each of said plurality of light entrance areas by R; and a size of each of said plurality of microlenses by Sr, the following formula (1):

$$Sr \geq 2t \times \tan\theta + R \quad (1)$$

(with the proviso that $\theta = \sin^{-1}(1/n)$)

is satisfied, and

wherein said plurality of light sources are disposed in said plurality of light entrance areas of said collimating plate respectively.

12. A collimating plate comprising:

a lens substrate;

a plurality of microlenses disposed on a surface of said lens substrate;

a plurality of light entrance areas, each having a rectangular form a center of which is on an optical axis of each of said plurality of microlenses and set on another surface of the lens substrate reverse to said plurality of microlenses; and

a light shield layer formed on another surface of said lens substrate reverse to said plurality of microlenses so as to cover other area than said plurality of light entrance areas,

wherein, when a refractive index of said lens substrate is represented by n; a thickness of said lens substrate by t; a length of a side of each of said plurality of light entrance areas by A; a length of another side of each of said plurality of light entrance areas by B; a size of each of said plurality of microlenses in a direction of said length A represented by Sa; and a size of each of said plurality of microlenses in a direction of said length B represented by Sb, the following formulae (2) and (3):

$$Sa \geq 2t \times \tan\theta + A \qquad (2)$$

$$Sb \geq 2t \times \tan\theta + B \qquad (3)$$

(with the proviso that $\theta = \sin^{-1}(1/n)$)

are satisfied.

13. The collimating plate according to claim 12, wherein said plurality of microlenses are either in square form viewed from a direction of the optical axis and are arranged in a square closed-packed state or in rectangular form viewed from the direction of the optical axis and are arranged in a rectangular closed-packed state.

14. A lighting apparatus comprising:

a light source;

a lamp housing for containing said light source, whose

inner surfaces are covered with a diffuse reflecting layer; and

a collimating plate,

wherein said collimating plate comprises a lens substrate;

a plurality of microlenses disposed on a surface of said lens substrate;

a plurality of light entrance areas, each having a rectangular form a center of which is on an optical axis of each of said plurality of microlenses and set on another surface of the lens substrate reverse to said plurality of microlenses; and

a light shield layer formed on another surface of said lens substrate reverse to said plurality of microlenses so as to cover other area than said plurality of light entrance areas,

wherein, when a refractive index of said lens substrate is represented by n; a thickness of said lens substrate by t; a length of a side of each of said plurality of light entrance areas by A; a length of another side of each of said plurality of light entrance areas by B; a size of each of said plurality of microlenses in a direction of said length A represented by Sa; and a size of each of said plurality of microlenses in a direction of said length B represented by Sb, the following formulae (2) and (3):

$$Sa \geq 2t \times \tan\theta + A \qquad (2)$$

$$Sb \geq 2t \times \tan\theta + B \qquad (3)$$

(with the proviso that $\theta = \sin^{-1}(1/n)$)

are satisfied.

15. A lighting apparatus comprising:

a collimating plate; and

a plurality of light sources,

wherein said collimating plate comprises a lens substrate;

a plurality of microlenses disposed on a surface of said lens substrate;

a plurality of light entrance areas, each having a rectangular form a center of which is on an optical axis of each of said plurality of microlenses and set on another surface of the lens substrate reverse to said plurality of microlenses; and

a light shield layer formed on another surface of said lens substrate reverse to said plurality of microlenses so as to cover other area than said plurality of light entrance areas,

wherein, when a refractive index of said lens substrate is represented by n; a thickness of said lens substrate by t; a length of a side of each of said plurality of light entrance areas by A; a length of another side of each of said plurality of light entrance areas by B; a size of each of said plurality of microlenses in a direction of said length A represented by Sa; and a size of each of said plurality of microlenses in a

direction of said length B represented by Sb, the following formulae (2) and (3):

$$Sa \geq 2t \times \tan\theta + A \quad (2)$$

$$Sb \geq 2t \times \tan\theta + B \quad (3)$$

(with the proviso that $\theta = \sin^{-1}(1/n)$)

are satisfied, and

wherein said plurality of light sources are disposed in said plurality of light entrance areas of said collimating plate respectively.

16. A liquid crystal display apparatus comprising:

a liquid crystal display panel; and

a lighting apparatus for launching light into said liquid crystal display panel,

wherein said lighting apparatus comprises a light source;

a lamp housing for containing said light source, whose inner surfaces are covered with a diffuse reflecting layer; and

a collimating plate,

wherein said collimating plate comprises a lens substrate;

a plurality of microlenses disposed on a surface of said lens substrate;

a plurality of light entrance areas, each having a rectangular form a center of which is on an optical axis of each of said plurality of microlenses and set on another surface of

the lens substrate reverse to said plurality of microlenses; and

a light shield layer formed on another surface of said lens substrate reverse to said plurality of microlenses so as to cover other area than said plurality of light entrance areas,

wherein, when a refractive index of said lens substrate is represented by n; a thickness of said lens substrate by t; a length of a side of each of said plurality of light entrance areas by A; a length of another side of each of said plurality of light entrance areas by B; a size of each of said plurality of microlenses in a direction of said length A represented by Sa; and a size of each of said plurality of microlenses in a direction of said length B represented by Sb, the following formulae (2) and (3):

$$Sa \geq 2t \times \tan\theta + A \qquad (2)$$

$$Sb \geq 2t \times \tan\theta + B \qquad (3)$$

(with the proviso that $\theta = \sin^{-1}(1/n)$)

are satisfied.

17. A liquid crystal display apparatus comprising:

a liquid crystal display panel; and

a lighting apparatus for launching light into said liquid crystal display panel,

wherein said lighting apparatus comprises a collimating

plate; and

a plurality of light sources,

wherein said collimating plate comprises a lens substrate;

a plurality of microlenses disposed on a surface of said lens substrate;

a plurality of light entrance areas, each having a rectangular form a center of which is on an optical axis of each of said plurality of microlenses and set on another surface of the lens substrate reverse to said plurality of microlenses; and

a light shield layer formed on another surface of said lens substrate reverse to said plurality of microlenses so as to cover other area than said plurality of light entrance areas,

wherein, when a refractive index of said lens substrate is represented by n; a thickness of said lens substrate by t; a length of a side of each of said plurality of light entrance areas by A; a length of another side of each of said plurality of light entrance areas by B; a size of each of said plurality of microlenses in a direction of said length A represented by Sa; and a size of each of said plurality of microlenses in a direction of said length B represented by Sb, the following formulae (2) and (3):

$$Sa \geq 2t \times \tan\theta + A \qquad (2)$$

$$Sb \geq 2t \times \tan\theta + B \qquad (3)$$

(with the proviso that $\theta = \sin^{-1}(1/n)$)

are satisfied, and

wherein said plurality of light sources are disposed in said plurality of light entrance areas of said collimating plate respectively.

18. A collimating plate comprising:

a lens substrate;

a plurality of microlenses disposed on a surface of said lens substrate;

a plurality of light entrance areas disposed on another surface of said lens substrate reverse to said plurality of microlenses, and having an optical axis of each of said plurality of microlenses; and

a light shield layer formed on said another surface of the lens substrate reverse to said plurality of microlenses so as to cover other area than said plurality of light entrance areas,

wherein a form of each of said plurality of microlenses is a part of an ellipsoid shown in the following formula (4),

wherein an eccentricity $\varepsilon$ of said ellipsoid is shown in the following formula (5) and

wherein, in said ellipsoid, a focal point away from a side from which light is issued is on a position of each of said

plurality of light entrance areas:

$$X^2/a^2 + y^2/a^2 + z^2/c^2 = 1 \quad (4)$$

$$\varepsilon = (c^2 - a^2)^{1/2}/c = 1/n \quad (5)$$

wherein x and y represent axes on the surface of the lens substrate; z represents the optical axis; and n represents a refractive index of a material forming said plurality of microlenses.

19. The collimating plate according to claim 18, wherein said plurality of microlenses are either in circular form viewed from a direction of the optical axis and are arranged in a closest packing state, or in hexagonal form viewed from the direction of the optical axis and are arranged in a hexagonal close-packed state.

20. A lighting apparatus comprising:

a light source;

a lamp housing for containing said light source, whose inner surfaces are covered with a diffuse reflecting layer; and

a collimating plate,

wherein said collimating plate comprises a lens substrate;

a plurality of microlenses disposed on a surface of said lens substrate;

a plurality of light entrance areas disposed on another

surface of said lens substrate reverse to said plurality of microlenses, and having an optical axis of each of said plurality of microlenses; and

a light shield layer formed on said another surface of the lens substrate reverse to said plurality of microlenses so as to cover other area than said plurality of light entrance areas,

wherein a form of each of said plurality of microlenses is a part of an ellipsoid shown in the following formula (4),

wherein an eccentricity $\varepsilon$ of said ellipsoid is shown in the following formula (5) and

wherein, in said ellipsoid, a focal point away from a side from which light is issued is on a position of each of said plurality of light entrance areas:

$$X^2/a^2 + y^2/a^2 + z^2/c^2 = 1 \qquad (4)$$

$$\varepsilon = (c^2 - a^2)^{1/2}/c = 1/n \qquad (5)$$

wherein x and y represent axes on the surface of the lens substrate; z represents the optical axis; and n represents a refractive index of a material forming said plurality of microlenses.

21. A lighting apparatus comprising:

a collimating plate; and

a plurality of light sources,

wherein said collimating plate comprises a lens substrate;

a plurality of microlenses disposed on a surface of said lens substrate;

a plurality of light entrance areas disposed on another surface of said lens substrate reverse to said plurality of microlenses, and having an optical axis of each of said plurality of microlenses; and

a light shield layer formed on said another surface of the lens substrate reverse to said plurality of microlenses so as to cover other area than said plurality of light entrance areas,

wherein a form of each of said plurality of microlenses is a part of an ellipsoid shown in the following formula (4),

wherein an eccentricity ε of said ellipsoid is shown in the following formula (5) and

wherein, in said ellipsoid, a focal point away from a side from which light is issued is on a position of each of said plurality of light entrance areas:

$$X^2/a^2 + y^2/a^2 + z^2/c^2 = 1 \qquad (4)$$

$$\varepsilon = (c^2 - a^2)^{1/2}/c = 1/n \qquad (5)$$

wherein x and y represent axes on the surface of the lens substrate; z represents the optical axis; and n represents a refractive index of a material forming said plurality of microlenses, and

wherein said plurality of light sources are disposed in said plurality of light entrance areas of said collimating plate respectively.

22. A liquid crystal display apparatus comprising:

a liquid crystal display panel; and

a lighting apparatus for launching light into said liquid crystal display panel,

wherein said lighting apparatus comprises a light source;

a lamp housing for containing said light source, whose inner surfaces are covered with a diffuse reflecting layer; and

a collimating plate,

wherein said collimating plate comprises a lens substrate;

a plurality of microlenses disposed on a surface of said lens substrate;

a plurality of light entrance areas disposed on another surface of said lens substrate reverse to said plurality of microlenses, and having an optical axis of each of said plurality of microlenses; and

a light shield layer formed on said another surface of the lens substrate reverse to said plurality of microlenses so as to cover other area than said plurality of light entrance areas,

wherein a form of each of said plurality of microlenses

is a part of an ellipsoid shown in the following formula (4),

wherein an eccentricity ε of said ellipsoid is shown in the following formula (5) and

wherein, in said ellipsoid, a focal point away from a side from which light is issued is on a position of each of said plurality of light entrance areas:

$$X^2/a^2 + y^2/a^2 + z^2/c^2 = 1 \qquad (4)$$

$$\varepsilon = (c^2 - a^2)^{1/2}/c = 1/n \qquad (5)$$

wherein x and y represent axes on the surface of the lens substrate; z represents the optical axis; and n represents a refractive index of a material forming said plurality of microlenses.

23. A liquid crystal display apparatus comprising:

a liquid crystal display panel; and

a lighting apparatus for launching light into said liquid crystal display panel,

wherein said lighting apparatus comprises a collimating plate; and

a plurality of light sources,

wherein said collimating plate comprises a lens substrate;

a plurality of microlenses disposed on a surface of said lens substrate;

a plurality of light entrance areas disposed on another

surface of said lens substrate reverse to said plurality of microlenses, and having an optical axis of each of said plurality of microlenses; and

a light shield layer formed on said another surface of the lens substrate reverse to said plurality of microlenses so as to cover other area than said plurality of light entrance areas,

wherein a form of each of said plurality of microlenses is a part of an ellipsoid shown in the following formula (4),

wherein an eccentricity ε of said ellipsoid is shown in the following formula (5) and

wherein, in said ellipsoid, a focal point away from a side from which light is issued is on a position of each of said plurality of light entrance areas:

$$X^2/a^2 + y^2/a^2 + z^2/c^2 = 1 \qquad (4)$$

$$\varepsilon = (c^2 - a^2)^{1/2}/c = 1/n \qquad (5)$$

wherein x and y represent axes on the surface of the lens substrate; z represents the optical axis; and n represents a refractive index of a material forming said plurality of microlenses, and

wherein said plurality of light sources are disposed in said plurality of light entrance areas of said collimating plate which are surrounded with said light shield layer and said diffuse reflecting layer.